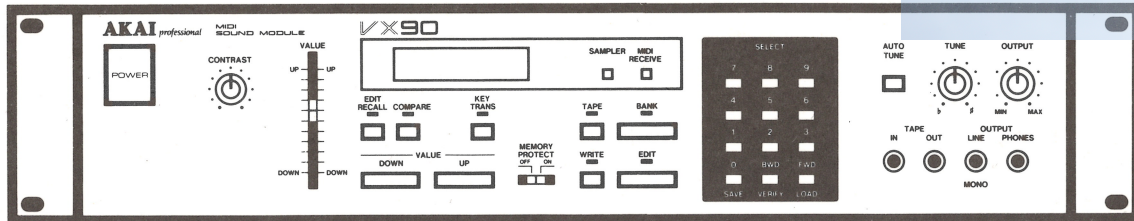# AKAI SERVICE MANUAL

MIDI SOUND MODULE

MODEL VX90

> CAUTION: Before servicing, to protect customer's sound data from being damaged, save all data to cassette tape.

SPECIFICATIONS

Voice Range........................... 24 – 120 (C1 – C9)
Voices 6
Tone generator....................... VCO (voltage controlled oscillator)
Internal memory .... 100 programs
External Memory.................. Cassette interface

Parameters
VCO Section .... Octave (2′, 4′, 8′, 16′)
Waveform (⊿, ∧, ⊓, ⊿+∧)
Pulse width control
PWM speed control
EG depth control
Sampler ON/OFF
Noise ON/OFF
A-B balance control
VCF Section........................... Cut-off frequency control
Resonance control
Key follow control
VCO modulation control
HPF control
EG depth and polarity switching (+/–)
Key velocity control
EG Section .... Attack time
Delay time
Sustain level
Release time
EG switching (VCF, VCA, VCF = VCA, VCA GATE)
VCA Section .... Level
Velocity
LFO Section.......................... LFO switching (VCO, VCF, VCA)
Waveform (⊿, ∧, ∖, ⊓, RND)
Depth control
Speed control
Delay control
Chorus (OFF, 1, 2)

Key assign (POLY, UNISON)
Bend...................................... VCO (± 1 octave)
Cut-off frequency (MIN – MAX)
Modulation depth (MIN – MAX)
MIDI channel (1 – 16)
Functions .... Output level control
Tune control (± 50 cents)
Auto tune ON/OFF
Key transpose ON/OFF
Memory protect ON/OFF
LCD contrast control
Edit control
 Value control volume
 Value UP/DOWN key
Edit recall ON/OFF
Compare ON/OFF
Edit
Write
Bank
Ten key
FWD/LOAD key
BWD/VERIFY key
O/SAVE key
Display .... LC display, LED
External Jacks .... MIDI (IN, OUT, THRU)
Sampler IN (13 PIN/DIN)
LINE OUT (MONO) × 1
STEREO OUT/LEFT (MONO), RIGHT
Headphone × 1
Tape (LOAD/IN, SAVE/OUT)
Dimensions .... 482.6 (W) × 88.1 (H) × 367 (D) mm
(EIA Rack mount/2U)
Weight .... 6.0 kg

* For improvement purposes, specifications and design are subject to change without notice.

★SAFETY INSTRUCTIONS

PRECAUTIONS DURING SERVICING

1. Parts identified by the △ symbol parts are critical for safety. Replace only with parts number specified.
2. In addition to safety, other parts and assemblies are specified for conformance with such regulations as those applying to spurious radiation.
   These must also be replaced only with specified replacements.
   Examples: RF converters, tuner units, antenna selector switches, RF cables, noise blocking capacitors, noise blocking filters, etc.
3. Use specified internal wiring. Note especially:
   1) Wires covered with PVC tubing
   2) Double insulated wires
   3) High voltage leads
4. Use specified insulating materials for hazardous live parts. Note especially:
   1) Insulation Tape
   2) PVC tubing
   3) Spacers (Insulating Barriers)
   4) Insulation sheets for transistors
   5) Plastic screws for fixing microswitch (especially in turntable)
5. When replacing AC primary side components (transformers, power cords, noise blocking capacitors, etc.), wrap ends of wires securely about the terminals before soldering.
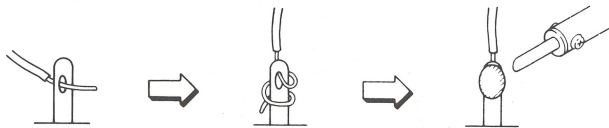
6. Observe that wires do not contact heat producing parts (heatsinks, oxide metal film resistors, fusible resistors, etc.).

7. Check that replaced wires do not contact sharp edged or pointed parts.
8. Also check areas surrounding repaired locatoins.
9. Use care that foreign objects (screws, solder droplets, etc.) do not remain inside the set.

SAFETY CHECK AFTER SERVICING

Confirm the specified insulation resistance between power cord plug prongs and externally exposed parts of the set is greater than 10 M ohms. but for equipment with external antenna terminals (tuner, receiver, etc.) and is intended for C or A, specified insulation resistance should be headphone jacks line-in-out jacks etc. more than 2.2 M ohms (ground terminals, microphone jacks).

PRECAUTION FOR THE LITHIUM BATTERY

The LITHIUM BATTERY employed for memory Back up has a explosive probability when the BATTERY itself is excessive heated.

IN CASE OF REPLACING: RESOLDER and SOLDER AS RECOMMENDED WAY.

[DANGER]   [RECOMMENDED WAY]

★INFORMATION

SYMBOLS FOR PRIMARY DESTINATION
Alphabet indicates the destination of the units as listed below.

Symbols	Principal Destinations
A	USA
B	UK
C	Canada
E	Europe (except UK)
J	Japan
S	Australia
V	W. Germany only
U	Universal Area
Y*	Custom version

VOLTAGE CONVERSION
(E, V, B, S Model only)

Befor connecting the power cord. SET the VOLTAGE SELECTOR located on the rear panel with a screwdriver so that the correct voltage is indicated.

240V —
220V —

I. DISMANTLING OF UNIT

In case of trouble, etc, necessitating dismantling, please dismantle in the order shown in the photographs. Reassemble in reverse order.
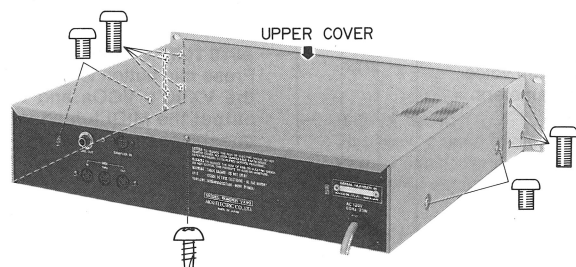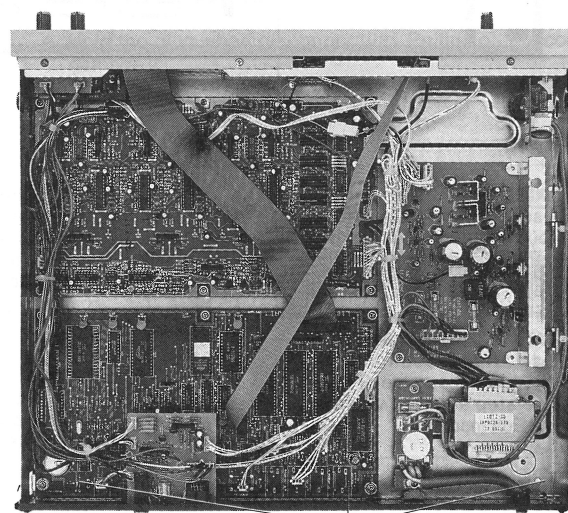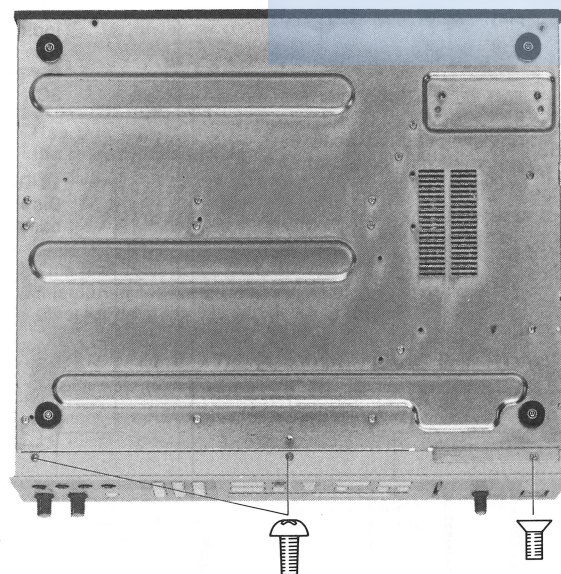
1. REMOVAL OF UPPER COVER

UPPER COVER

2. REMOVAL OF FRONT PANEL

KNOB①   KNOB② KNOB③

* Remove the knobs① to ③ then remove front panel

II. CONTROLS

POWER Switch
Use this switch to turn the VX90 power on and off.

CONTRAST Control
Use this control to adjust the contrast of the LC display.

EDIT RECALL Button and Indicator
Use this button to recall the last voice data edited when in the play mode.

COMPARE Button and Indicator
Use this button to compare the voice to be preset with the previously set voice when in the Edit mode.

KEY TRANS Button and Indicator
Use this button to transfer the pitch ±1 octave from 3C.

LC Display
Displays the program voice names and the parameters.

BANK Button and Indicator
Use this button with the SELECT buttons to recall the program number or the parameter.

SELECT Button (0—9)
Use these buttons with the BANK button to recall either the program number or the parameter number.

AUTO TUNE Button
Press this button to tune all the VX90's VCOs and to output the MIDI tuning request message to connected equipment.

VALUE Slide Controller
Use this control to perform rough adjustment of the parameter data when in the Edit mode.

VALUE UP/DOWN Buttons
Use these buttons to change the parameter data one step at a time when in the Edit mode.

MEMORY PROTECT Switch
Use this switch to protect the memory banks. Keep it at the ON position except when writing a program.

WRITE Button and Indicator
Use this button to store the parameters preset in the Edit mode in the memory bank.

EDIT Button and Indicator
Use this button to preset new voice data.

TAPE Button and Indicator
Use this button to store the data onto a cassette, either all programs at once or one bank at a time.

LINE OUTPUT Jack
Use this jack for connection to the input of a keyboard amplifier or mixer.

TAPE IN/OUT Jacks
These jacks are used to connect a tape recorder and save or load the voice data for all programs.

TUNE Control
Use this control to adjust the pitch of the VX90 to match other instruments. The pitch can be changed by ±50 cents.

Fig. 2-1 Front View

STEREO Jacks
Use this jacks for connection to the input of a keyboard amplifier or mixer.

MIDI THRU Jack:
This jack is used to output the data received at the MIDI IN jack without changing it.

MIDI IN Jack:
This jack is used for reception of MIDI signals from other MIDI equipment.

PEDAL SUSTAIN Jack:
Use this jack to increase the release time through a pedal unit.

MIDI OUT Jack:
This jack is used for transmission of MIDI signals to other MIDI equipment.

SAMPLER IN Jack
Connect this jack to an AKAI sampler (the S612, for example) to edit the sampler voices or to mix the sampler voices to the VX90's internal sound sources.

Fig. 2-2 Rear View

III. CONNECTIONS

- The VX90 can be operated by such MIDI equipment as a MIDI sequencer or a MIDI master keyboard or any keyboard.
- As the VX90 is not equipped with a built-in amplifier or speakers, a separate power amplifier (a keyboard amplifier for example) and instrument speakers are needed.

Before Making Connections
- Be sure the power is off, or connect the power cord last.
- Insert the plugs firmly into the jacks. Poor connections will result in noise or distortion.
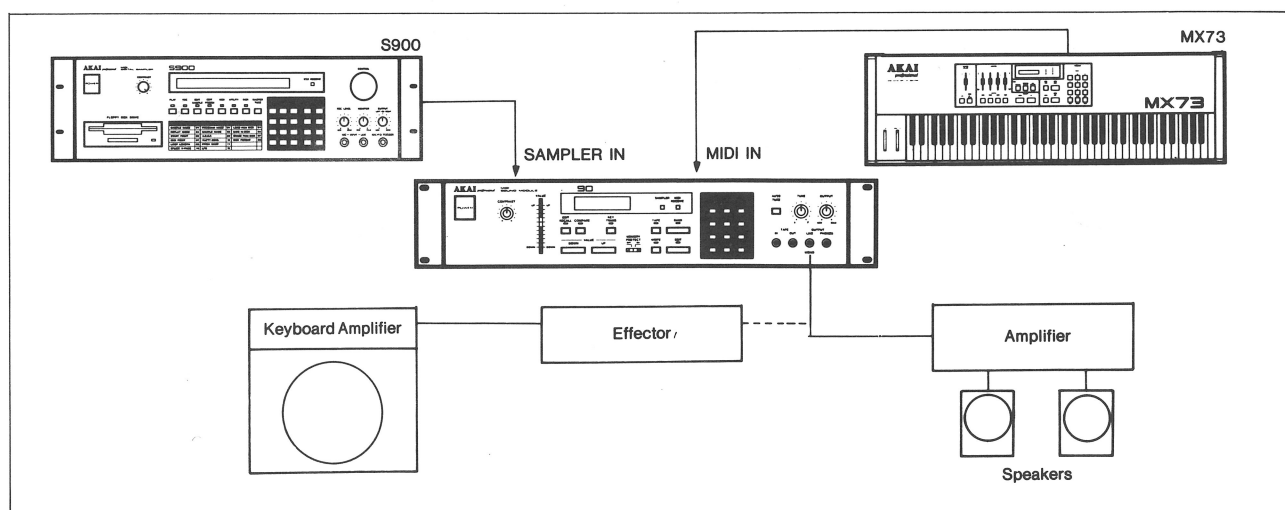- Hold the plug when disconnecting. Pulling on the cord will damage it.

Fig. 3-1
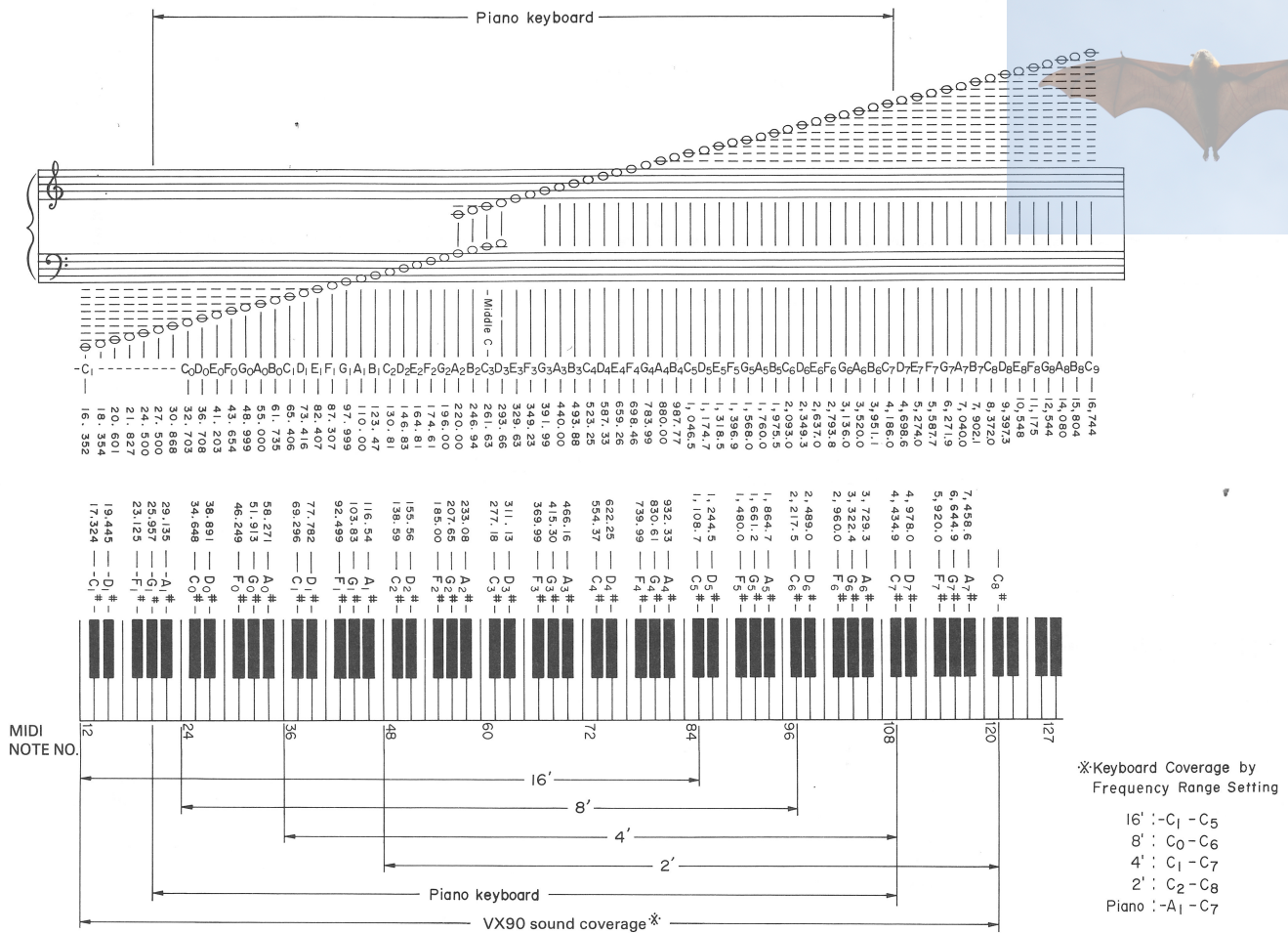
Fig. 4-1

V. PRINCIPAL PARTS LOCATION

POWER TRANSFORMER
L1012-10 J
-30 C, A
-50 E, V, B, S

POWER SUPPLY PCB
L1013B5050

FILTER PCB
L6001D5080

DIN JACK PCB
L1014D502A
(EXCEPT J MODEL)

OUTPUT AMP PCB
L1014B501B
(J MODEL ONLY)

CHORUS PCB
L1013B5030
(EXCEPT J MODEL)

CPU PCB
L1013A5010

POWER SW PCB
L1014B501H

CONTRAST VR PCB
L1014B501E

LCD BLOCK

VALUE VR PCB
L1014B501B

PROTECT SW, PCB
L1014B501F

OPERATION PCB
L1014B501A

JACK PCB
L1014B501C

TUNE & OUT VR PCB
L1014D502B

VOICE PCB
L1013A5040

VI. ADJUSTMENT

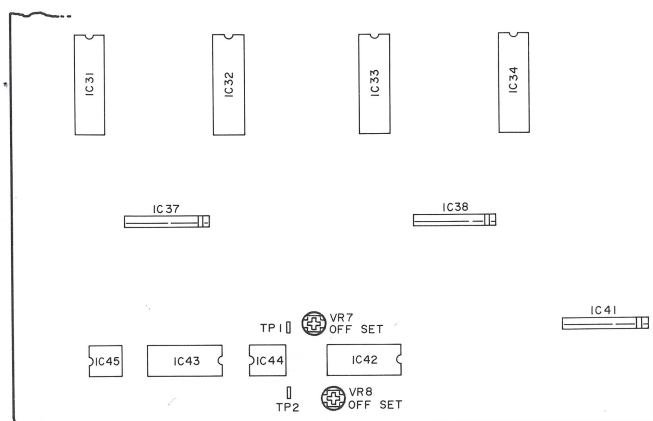## 6-1. OFF-SET OF FINAL VCA ON THE VOICE PC BOARD

Fig. 6-1 Adjustment point of VOICE PCB

1) Set the VCA LEVEL to "100".

      PUSH   PUSH   PUSH   SET VALUE VR

  [EDIT ⇨ BANK ⇨ 3 0 ⇨ MAX "100"]

2) Connect the DC Digital Voltmeter between TP1 (UPPER CH) or TP2 (LOWER CH) and chassis GND.

3) Adjust VR7 (UPPER CH) or VR8 (LOWER CH), so that the reading on the DC digital voltmeter is within 0 ± 2 mV.

6-2. BALANCE OF BBD OUTPUT ON THE CHORUS PC BOARD (EXCEPT J MODEL)

Note: This adjustment is not necessary for the Japan model due to model for Japan is not equipped with this chorus function.
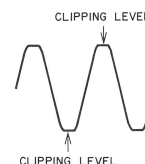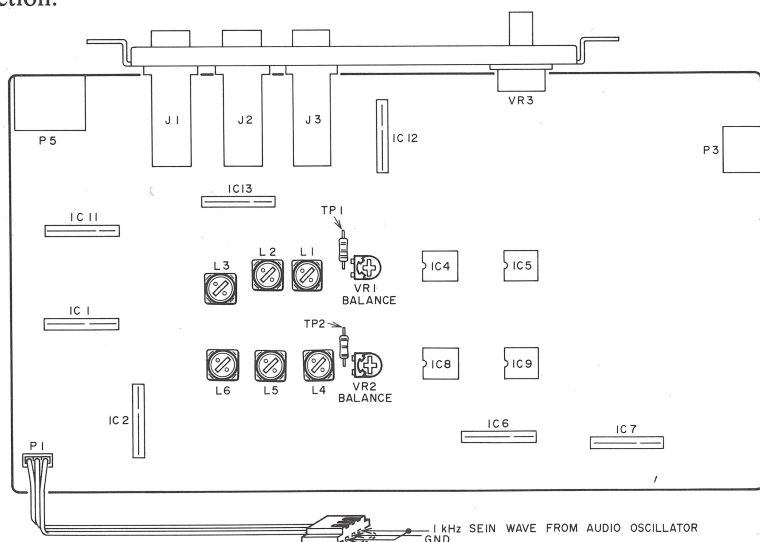

Fig. 6-2. Adjustment point of CHORUS PCB and instrument connection

1) Set the CHORUS "1" mode.

      PUSH   PUSH   PUSH   PUSH

  [EDIT ⇨ BANK ⇨ 4 5 ⇨ UP]

2) Connect the oscilloscope between TP1 and chassis GND.

3) Extract J5 on the VOICE PCB and connect the audio signal generator to the connector J5 as shown in Fig. 6-2.

4) Set the frequency of the audio oscillator to 1 kHz sine wave and adjust its output control so that the wave-form on the oscilloscope is clipped a bit.

5) Adjust VR1 so that the clipping level at upper side and lower side of the waveform are the same level.

6) Connect the oscilloscope between TP2 and chassis GND and adjust VR2 as same manner as 5).

Note: For the easy connection between the audio oscillator and the connector J5, build a special connection cord as shown.
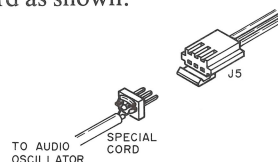

Fig. 6-3. SPECIAL CORD
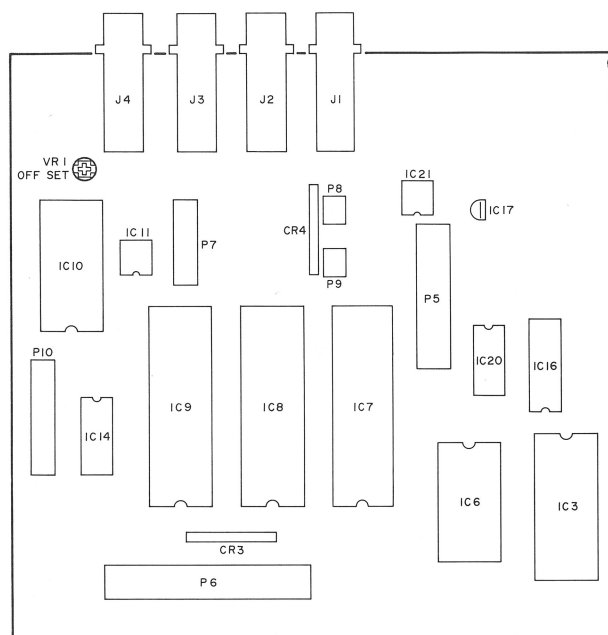
6-3. OFF-SET OF IC6 (LF356) ON THE CPU PC BOARD

Fig. 6-4. Adjustment point of CPU PCB

1) Set to center position of VR1.

VII. PARAMETERS

Display Parameter		Data	Description
E00	VCOaOCT (Octave)	2', 4', 8', 16'	Switches the pitch. 8' is the basic pitch. When set to 16' or 4', the range changes by one octave.
E01	VCOaWF (Wave Form)	∿, ∧, ⊓, ∿+∧	Switches the output waveform.
E02	VCOaPW	0~100	Sets the pulse width. However, operates at waveform selected by E01.
E03	VCOaPWMS	0~100	Sets the PWM depth depending on the pulse wave set by E02 VCOaPW. (NOTE: When E02 is "0", there is no PWM.) This adjusts the PWM speed.
E04	VCOaEG	0~100	Makes it possible to set EG for the VCOs.
E05	NOISE b	OFF/ON	Pink noise is output when "ON".
E06	SAMPLER b	OFF/ON	When AKAI sampler (S-612, etc.) is connected, it can be used as a sound source for the VX90.
E07	a—b BAL (BALance)	0~100	Adjusts output level balance between VCO(a) and NOISE and SAMPLER(b). When "0", only VCO(a) sound is produced, and when "100", only NOISE and SAMPLER(b) sound is produced.
E10	VCF FREQ (Cutoff FREQuency)	0~100	Adjusts the VCF cut-off frequency.
E11	VCF RESO (RESOnance)	0~100	Allows reinforcement of the cut-off point area determined by E10 VCF FREQ (cut-off frequency).
E12	VCF OWFM (Oscillator Wave Form Modulation)	0~100	Oscillator waveform modulation. Adds modulation from the VCOs to the VCFs depending on the waveform selected by E10.
E13	VCF EG	−50~0~+50	Controls the VCF cut-off frequency by EG signal, and changes the previously set VCF cut-off point. −50 ← 0 → +50
E14	VCF KEYF (KEYboard Follow)	0~100	Changes the cut-off frequency depending on the keyboard position. Adjusts the degree of this change.
E15	VCF VELO (VELOcity)	−50~0~+50	Adjusts the amount of E13 VCF control by the speed at which the key is struck. (NOTE: When VCF EG is "0", VCF VELO effect is "0".)
E16	HPF (High Path Filter)	0~100	Adjusts the amount of low frequency which passes.

E20	EG SEL (Mode SELect)	A≠F,A=F	I. When A≠F, the EG effect acts on VCA for E21—24 and the EG effect acts on VCO and VCF for E25—28. (Refer to I) II. When A=F, the EG effect acts on VCA and VCF for E21—24 and on VCO for E25—28. (Refer to II)
I.			
E21	EGA A (Attack)	0~100	Sets the VCA attack time.
E22	EGA D (Decay)	0~100	Sets the VCA decay time.
E23	EGA S (Sustain)	0~100	Sets the VCA sustain level.
E24	EGA R (Release)	0~100	Sets the VCA release time.
E25	EGOF A	0~100	Sets the VCO and VCF attack time.
E26	EGOF D	0~100	Sets the VCO and VCF decay time.
E27	EGOF S	0~100	Sets the VCO and VCF sustain level.
E28	EGOF R	0~100	Sets the VCO and VCF release time.
II.			
E21	EGAF A	0~100	Sets the VCA and VCF attack time.
E22	EGAF D	0~100	Sets the VCA and VCF decay time.
E23	EGAF S	0~100	Sets the VCA and VCF sustain level.
E24	EGAF R	0~100	Sets the VCA and VCF release time.
E25	EGO A	0~100	Sets the VCO attack time.
E26	EGO D	0~100	Sets the VCO decay time.
E27	EGO S	0~100	Sets the VCO sustain level.
E28	EGO R	0~100	Sets the VCO release time.
E30	VCA LEV (LEVel)	0~100	Sets the Final VCA output level.
E31	VCA VELO (VELOcity)	−50~0~+50	Adjusts the degree to which the VCAs are controlled by the strength at which the key is struck.
E40	LFO SEL	OFF,VCO,VCF,VCA	Makes it possible to apply LFO to either the VCOs, VCFs, or VCAs.
E41	LFO WF (Wave Form)	∿, ⋀, ⋀, ⊓, RNDM	Makes it possible to select the LFO waveform.
E42	LFO FREQ (FREQuency)	0~100	Adjusts the LFO change speed.
E43	LFO DP (Depth)	0~100	Sets the depth of frequency modulation.
E44	LFO DEL (DELay)	0~100	Adjusts the time required from when a key is pressed until the effect is produced.
E45 (*)	CHORUS	OFF, 1, 2	Applies the stereo chorus effect.

(*): Model for Japan is not equipped with this E45 function.

E50	ASSIGN	POLY, DUAL, UNI	Sets to 6 chords in the POLY mode, 3 chords in the DUAL mode, and 1 chord in the UNI (unison) mode.
E51	SOL PORT (PORTament)	0~100	Applies the portamento effect in the DUAL or UNI (unison) modes.
E52	DETUNE	0~100	Applies the effect in the DUAL or UNI (unison) modes. Richness and softness can be added to the sound by slightly changing the VCO frequency.
E60	WH BND O (Pitch BeND Range, VCO)	0~12	Makes pitch variable in semi-tone steps. At "12", the pitch is variable by ±1 octave.
E61	WH BND F (Pitch BeND Range, VCF)	0~100	Makes the cut-off frequency variable.
E62	WH MOD (MODulation level)	0~100	Makes the LFO modulation variable. * When "0", LFO is not applied when the modulation wheel is operated.
E72	MIDI CH	1~16	Makes MIDI CH. selection possible.
E73	MIDI PC (Program Change)	ENA, DIS	When set at ENA (enable), the MIDI program change data can be transmitted or received. When set at DIS (disable), the data cannot be transmitted or received.
E80	LABEL	A~Z, 0~9, [SPACE], Etc	Makes it possible to input a voice name in up to 12 letters. The cursor is moved by the FWD/BWD buttons, and the letters are selected by the slide controller or the UP/DOWN buttons. (Refer to Page 7)

* The E72 MIDI CH and E73 MIDI PC are common for all 100 programs.

VIII. MIDI IMPLEMENTATION CHART

[MIDI Sound Module]

Model VX-90 MIDI Implementation Chart

Version: 1.0

Function ...		Transmitted	Recognized	Remarks
Basic Channel	Default	1 – 16	1 – 16 ★	☆ memorized
	Changed	1 – 16	1 – 16 ★	
Mode	Default	MODE 3, MODE 4	MODE 3	memorized
	Messages		X	
	Altered	★★★★★★★★★★★★★★★★★★★	X	
Note Number	: True voice	24 – 96 ★★★★★★★★★★★★★★★★★★★	0 – 127 24 – 120	
Velocity	Note ON	X 9nH V = 1 – 127	○	
	Note OFF	X 9nH V = 0, 8nH	○	
After Touch	Key's	X	X	
	Ch's	X	X	
Pitch Bender		X	○	7 bit RESO
Control Change	1	X	○	Modulation wheel
	7	X	○	Volume
	64	X	○	Sustain foot sw
Prog Change:	True #	○ 0 – 99 ★★★★★★★★★★★★★★★★★★★	○ 0 – 127 0 – 99	
System Exclusive		X	X	
System Common	: Song Pos	X	X	
	: Song Sel	X	X	
	: Tune	○	○	
System Real Time	: Clock	X	X	
	: Commands	X	X	
Aux Messages	: Local ON/OFF	X	X	
	: All Notes OFF	○	○	
	: Active Sense	X	X	
	: Reset	X	X	
Notes				

Mode 1: OMNI ON, POLY   Mode 2: OMNI ON, MONO   ○: Yes
Mode 3: OMNI OFF, POLY   Mode 4: OMNI OFF, MONO   X: No

SERVICE MANUAL

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IX. PARTS LIST

HOW TO USE THIS PARTS LIST

1. This Parts List lists those parts which are considered necessary for repairs. Other common parts, such as resistors and capacitors, are listed in the "Common List for Service Parts" from which these parts should be selected and stocked.
2. The Recommended Spare Parts List shows those parts in the Parts List which are considered particularly important for service.
3. Parts not shown in the Parts List and "Common List for Service Parts" will not in principle be supplied.
4. How to read the Parts List.

   a) Mechanism Block   b) PC Board

2. HEAD BASE BLOCK

REF. NO.	PART NO.	DESCRIPTION
2-1x	BH-T2023A320A	HEAD BASE BLOCK
2-2	HP-H2206A010A	HEAD R/P PR4-8FU C
2-3	ZS-477876	PAN20×03STL CMT
2-4	ZS-536488	BID20×08STL CMT
2-5	ZG-402895	SP CS ANGLE ADJUST

- SP (Service Parts) Classification
- A small "x" indicates that this part is not shown in the Photo or Illustration.
- This number corresponds with the individual parts index number in that figure.
- This number corresponds with the Figure Number.

The available PC Board Blocks are listed separately.

6. MAIN PC BOARD

REF. NO.	PART NO.	DESCRIPTION
6-IC1	EI-324536	IC HD14049BP
6-IC2	EI-336801	IC MB8841-564M
6-C1A	EC-338399	C MMY V 223M 250AC [U,E,B,S]
6-C1B	EC-350949	C MMY V 223M 250DC [J]
6-C1C	EC-338397	C MMY V 223M 125AC [C,A]
6-X1	EI-318384	OSC X'TAL NC-18C

Symbols for primary destination
- [A]: AAL(U.S.A.)   [S]: SAA(Australia)
- [B]: BEAB(England) [U]: U/T(Universal Area)
- [C]: CSA(Canada)   [V]: VDE(W. Germany)
- [E]: CEE(Europe)   [Y]: Custom Version
- [J]: JPN(Japan)

- SP (Service Parts) Classification
- These reference symbols correspond with component symbols in the Schematic Diagrams.

5. When Part No. is known, Parts Index at end of Parts List can be used to locate where that part is shown in Parts List by its Reference No. listed at right of Part No.

RECOMMENDED SPARE PARTS LIST

Because, if the parts listed below are on hand, almost any repair can be accomplished, we suggest that you stock these Recommended Spare Parts Items.

REF. NO.		PART NO.	DESCRIPTION
1		BT-364697	⚠ TRANS POWER L1012-10 (J)
2		BT-364243-A	⚠ TRANS POWER L1012-30 (C,A)
3		BT-364698-A	⚠ TRANS POWER L1012-50 (E,V,B,S)
4		ED-200213	⚠ D SILICON DBA40C-K15 200/2.6A
5		ED-357038	⚠ D SILICON DBB10B 100/1.0A
6		ED-364261	D LED SLP-981C-50
7		ED-361055	D SILICON DS135E-UB1
8		ED-301911	D SILICON H DS448
9		ED-344280	D SILICON GMA-01-FY2 F05
10		ED-624903	D SILICON H 1S2473
11		ED-331626	D ZENER H HZ3 B2
12		ED-329058	D ZENER H HZ5 C1
13		ED-331617	D ZENER H HZ6 A3
14		ED-319167	D ZENER H HZ6 C3
15		ED-306012	D ZENER H HZ7 A3
16		ED-346463	D ZENER H HZ7FA F10 C3
17		EF-355226	⚠ FUSE BET T 1.00A 250V [B]
18	N	EF-359343	⚠ FUSE BET T 1.60A 250V [B]
19		EF-358974	⚠ FUSE BET T 630MA 250V [B]
20		EF-623103	⚠ FUSE SEMKO T 1.00A 250V [E,V,S]
21		EF-601964	⚠ FUSE SEMKO T 1.60A 250V [E,V,S]
22		EF-601942	⚠ FUSE SEMKO T 630MA 250V [E,V,S]
23		EF-309387	⚠ FUSE TSC A 250V 1.00A [J]
24		EF-311839	⚠ FUSE TSC A 250V 1.60A [J]
25		EF-309392	⚠ FUSE TSC 125V 1.25A [C,A]
26		EF-308847	⚠ FUSE TSC 125V 1.60A [C,A]
27		EI-364319	IC CD4051BE
28		EI-364246	IC CEM3394
29		EI-365872	IC EHK-MD6207
30		EI-355891	IC HD74LS32P
31		EI-360954	IC IR9311
32		EI-364245	IC LA6082S
33		EI-364273	IC LF356N
34		EI-364308	IC MN3009
35		EI-353227	IC M5216L
36	N	EI-337228	IC M5218L
37		EI-348123	IC M5230L
38		EI-362588	IC M5238P
39		EI-355904	IC M74LS04P
40		EI-364275	IC M74LS05N
41		EI-366167	IC M74LS139
42		EI-355906	IC M74LS14P
43		EI-355917	IC M74LS373P
44		EI-355909	IC M74LS38P
45		EI-355910	IC M74LS42P
46		EI-364247	IC NJM13600
47		EI-359626	IC NJM78M15A
48		EI-359628	IC NJM79M15A
49		EI-364253	IC PST520D-2
50		EI-302233	IC TC4051BP
51		EI-310036	IC TC4066BP
52		EI-362521	IC TC5564PL-20
53		EI-367332-C	IC TMM27128AD-20 AX73 V1.2A CUSTOM [C,A,E,B,S]
54	N	EI-365584	IC TMM27128AD-20 VX90 V1.2 CUSTOM [J]
55		EI-357060	IC μPD7811G-144
56		EI-354146	IC μPD8253C-2
57		EI-354149	IC μPD8255AC-2
58		EI-364257	OSC X'TAL NR-18 12MC
59		EJ-364256	DIN J M1704 3P
60		EJ-364322	PHONE J 2P HLJ0520-110 W/NUT WASHER
61		EJ-354105	PHONE J 2P HLJ0520-110 6.3
62		EJ-357735	PHONE J 3P HLJ0540-010 6.3
63		EJ-354269	PHONE J 3P HLJ0540-110 6.3
64		EM-365880	IND LCD DM001Z-1BL7
65		EQ-348929	RELAY SIGNAL G5A-232P 2TR 12V
66		ER-326169	⚠ R FUSE ERD2FC S10 1/4W 22ROG
67		ER-365262	⚠ R FUSE ERD2FC S10 1/4W 7R5J

REF. NO.		PART NO.	DESCRIPTION
68		ER-328278	⚠ R FUSE ERD2FC 1/4W 10ROG
69		ER-364336	⚠ R OMF H S12 FS 1W 201J
70		ER-360725	⚠ R OMF H S12 FS 1W 221J
71		ER-341331	⚠ R OMF H S15 FS 1W 181J
72		ER-366282	⚠ R OMF H S15 FS 1W 911J
73		ES-337902	⚠ SW PUSH SDLD1P 01-1
74		ES-306430	⚠ SW SLIDE J-S4013 #01 01-2 [E,V,B,S]
75		ES-360242	SW SLIDE SSSU02 2-02-02N
76		ES-365851	SW TACT SPPQ19
77		ET-354167	DETECTOR PC900
78		ET-348302	TR FET 2SK381 C,D F05
79		ET-353899	TR 2SA1317 S,T,U
80		ET-356817	TR 2SB891 Q,R
81		ET-360067	TR 2SC3330 T,U F05
82		ET-349081	TR 2SC3383 S,T
83		ET-349608	TR 2SC3383 T,U
84		ET-349592	TR 2SC3400 F05
85		ET-352994	TR 2SC3401 F05
86		ET-354083	TR 2SD1189 Q,R
87		EV-362513	VR ROTARY EVH-60AF20 B14
88	N	EV-367321	VR ROTARY 16P L35 3B203×2
89		EV-359549	VR ROTARY 16P10 B103
90		EV-365852	VR SLIDE VJ4513-2PVN10C 103

1. P.C BOARD BLOCK

REF. NO.	PART NO.	DESCRIPTION
1-1	BA-L1013A050B	PC VOICE BLK VX90
1-2	BA-L1013A020B	PC CPU BLK VX90
1-3	BA-L1014A030A	PC OPERATION BLK VX90
1-4	BA-L1013A060A	PC POWER BLK AX73 (J)
1-4A	BA-L1013A060B	PC POWER BLK AX73 (C,A)
1-4B	BA-L1013A060C	PC POWER BLK AX73 (E,V,B,S)
1-5	BA-L1013A070B	PC CHORUS BLK VX90 [EXCEPT JPN]

2. VOICE P.C BOARD

REF. NO.	PART NO.	DESCRIPTION
2-C80 to 85	EC-362220	C PP V F05 PP 202J 50DC
2-D1	ED-331626	D ZENER H HZ3 B2
2-D2	ED-346463	D ZENER H HZ7FA F10 C3
2-D3	ED-301911	D SILICON H DS448
2-D4 to 19	ED-344280	D SILICON H GMA-01-FY2 F05
2-IC1,2	EI-364319	IC CD4051BE
2-IC3,4	EI-302233	IC TC4051BP
2-IC5 to 20	EI-364245	IC LA6082S
2-IC21 to 27	EI-337228	IC M5218L
2-IC28 to 30	EI-310036	IC TC4066BP
2-IC31 to 36	EI-364246	IC CEM3394
2-IC37 to 39	EI-337228	IC M5218L
2-IC40	EI-360954	IC IR9311
2-IC41	EI-337228	IC M5218L
2-IC42,43	EI-364247	IC NJM13600
2-IC44,45	EI-362588	IC M5238P
2-TR1 to 3	ET-349592	TR 2SC3400 F05
2-TR4	ET-360067	TR 2SC3330 T,U F05
2-TR5,14,15	ET-349081	TR 2SC3383 S,T
2-TR16	ET-352994	TR 2SC3401 F05
2-VR7,8	EV-336770	R S-FIX H RH0651CS4 3P 0.05W 473
2-1	EJ-363001	SOCKET IC DILB20P-8J

3. CPU P.C BOARD

REF. NO.	PART NO.	DESCRIPTION
3-C11	EC-347205	C MC V F05 FM 220J 500DC
3-D1 to 6,9	ED-301911	D SILICON H DS448
3-D7,8	ED-624903	D SILICON H 1S2473
3-FR1	ER-326169	⚠ R FUSE ERD2FC S10 1/4W 22R0G
3-IB1 to 4	EH-355561	COMP R EXB-R88 103K
3-IB5	EH-362519	COMP R RML-S4-J103
3-IC1	EI-357060	IC µPD7811G-144
3-IC2	EI-355917	IC M74LS373P
3-IC5	EI-362521	IC TC5564PL-20
3-IC6	EI-354146	IC µPD8253C-2
3-IC7 to 9	EI-354149	IC µPD8255AC-2
3-IC10	EI-365872	IC EHK-MD6207
3-IC11	EI-364273	IC LF356N
3-IC12	EI-355910	IC M74LS42P
3-IC13,14	EI-366167	IC M74LS139
3-IC15	EI-355891	IC HD74LS32P
3-IC16	EI-355917	IC M74LS373P
3-IC17	EI-364253	IC PST520D-2
3-IC18	EI-355906	IC M74LS14P
3-IC19	EI-364275	IC M74LS05N
3-IC20	EI-355904	IC M74LS04P
3-IC21	EI-360954	IC IR9311
3-J4	EJ-364322	PHONE J 2P HLJ0520-110 W/NUT WASHER
3-J5	EJ-364256	DIN J M1704 3P
3-PH1	ET-354167	DETECTOR PC900
3-R37	ER-366282	⚠ R OMF H S15 FS 1W 911J
3-TR1,2	ET-349608	TR 2SC3383 T,U
3-TR4	ET-360067	TR 2SC3330 T,U F05
3-VR1	EV-307709	R S-FIX H RH0651CJ4 3P 0.05W 223
3-X1	EI-364257	OSC X'TAL NR-18 12MC
3-1	EJ-358691	SOCKET IC DILB28P-8J
3-IC3	EI-365584	IC TMM27128AD-20 VX90 V1.2 CUSTOM [J]
3-IC3A	EI-367332-C	IC TMM27128AD-20 AX73 V1.2A CUSTOM [C,A,E,V,B,S]

4. OPERATION P.C BOARD

REF. NO.	PART NO.	DESCRIPTION
4-D1 to 22	ED-301911	D SILICON H DS448
4-D24 to 31	ED-364261	D LED SLP-981C-50
4-IB1	EH-362502	COMP R RML S8 J221
4-IC1,2	EI-355909	IC M74LS38P
4-SW1 to 22	ES-365851	SW TACT SPPQ19

5. DIN JACK P.C BOARD (EXCEPT JAPAN MODEL)

REF. NO.	PART NO.	DESCRIPTION
5-J1	EJ-360771	DIN J TCS5037-01-241 13P

6. JACK P.C BOARD

REF. NO.	PART NO.	DESCRIPTION
6-J1	EJ-357735	PHONE J 3P HLJ0540-010 6.3
6-J2 to 4	EJ-354269	PHONE J 3P HLJ0540-110 6.3

7. TUNE & OUT P.C BOARD

REF. NO.	PART NO.	DESCRIPTION
7-VR1	EV-367321	VR ROTARY 16P L35 3B203×2
7-VR2	EV-359549	VR ROTARY 16P10 B103

8. CONTRAST VR P.C BOARD

REF. NO.	PART NO.	DESCRIPTION
8-VR1	EV-362513	VR ROTARY EVH-60AF20 B14

9. VALUE VR P.C BOARD

REF. NO.	PART NO.	DESCRIPTION
9-VR1	EV-365852	VR SLIDE VJ4513-2PVN10C 103

10. PROTECT SW P.C BOARD

REF. NO.	PART NO.	DESCRIPTION
10-SW1	ES-360242	SW SLIDE SSSU02 2-02-02N

11. POWER SUPPLY P.C BOARD

REF. NO.	PART NO.	DESCRIPTION
11-C1	EC-322804	C EC V CUT AS1 472M 16.0DC
11-C2,3	EC-316231	C EC V CUT AS1 222M 35.0DC
11-D1	ED-200213	⚠ D SILICON DBA40C-K15 200/2.6A
11-D2	ED-357038	⚠ D SILICON DBB10B 100/1.0A
11-D3,5,6	ED-361055	D SILICON DS135E-UB1
11-D4	ED-319167	D ZENER H HZ6 C3
11-D7	ED-306012	D ZENER H HZ7 A3
11-D9,11	ED-329058	D ZENER H HZ5 C1
11-D12	ED-361055	D SILICON DS135E-UB1
11-D13	ED-301911	D SILICON H DS448
11-D14	ED-331617	D ZENER H HZ6 A3
11-D15	ED-319167	D ZENER H HZ6 C3
11-FR1, 2	ER-328278	⚠ R FUSE ERD2FC 1/4W 10R0G
11-FR3	ER-365262	⚠ R FUSE ERD2FC S10 1/4W 7R5J
11-IC1	EI-359552	IC M5236L
11-IC2	EI-359626	IC NJM78M 15A
11-IC3	EI-359628	IC NJM79M 15A
11-IC4	EI-348123	IC M5230L
11-R1	ER-360725	⚠ R OMF H S12 FS 1W 221J
11-TR1	ET-356817	TR 2SB891 Q,R
11-TR2	ET-354083	TR 2SD1189 Q,R
11-TR3	ET-356817	TR 2SB891 Q,R
11-TR4 to 6	ET-360067	TR 2SC3330 T,U F05
11-TR7	ET-354083	TR 2SD1189 Q,R
11-1	EZ-200473	SILICON RUBBER SHEET TC-30
11-2	ZW-632226	WASHER INSULATOR (BUSH M)
11-F2	EF-311839	⚠ FUSE TSC 250V 1.60A [J]
11-F2A	EF-308847	⚠ FUSE TSC 125V 1.60A [C,A]
11-F2B	EF-601964	⚠ FUSE SEMKO T 1.60A 250V [E,V,S]
11-F2C	EF-359343	⚠ FUSE BET T 1.60A 250V [B]
11-F3,4	EF-309387	⚠ FUSE TSC A 250V 1.00A [J]
11-F3A,4A	EF-309392	⚠ FUSE TSC 125V 1.25A [C,A]
11-F3B,4B	EF-623103	⚠ FUSE SEMKO T 1.00A 250V [E,V,S]
11-F3C,4C	EF-355226	⚠ FUSE BET T 1.00A 250V [B]

12. POWER SW P.C BOARD

REF. NO.	PART NO.	DESCRIPTION
12-C1	EC-361942	⚠ C CE V DNS103ZV V 103Z 400AC
12-SW1	ES-337902	⚠ SW PUSH SDLD1P 01-1

13. FILTER P.C BOARD

REF. NO.	PART NO.	DESCRIPTION
13-C2,3	EC-358450	C CE V DNS102MBE B 102M 400AC
13-C4	EC-338411	C CE V FZ 103P 400AC
13-FL1	EO-360068	COIL LF LF-2 B
13-F1	EF-309387	⚠ FUSE TSC A 250V 1.00A [J]
13-F1A	EF-309392	⚠ FUSE TSC 125V 1.25A [C,A]
13-F1B	EF-601942	⚠ FUSE SEMKO T 630MA 250V [E,V,S]
13-F1C	EF-358974	⚠ FUSE BET T 630MA 250V [B]

14. CHORUS P.C BOARD (EXCEPT JAPAN MODEL)

REF. NO.	PART NO.	DESCRIPTION
14-D3 to 10	ED-301911	D SILICON H DS 448
14-IC1,2	EI-337228	IC M5218L
14-IC4	EI-364308	IC MN3009
14-IC5	EI-360228	IC MN3101
14-IC6,7	EI-337228	IC M5218L
14-IC8	EI-364308	IC MN3009
14-IC9	EI-360228	IC MN3101
14-IC11	EI-337228	IC M5218L
14-IC12	EI-353227	IC M5216L
14-IC13	EI-337228	IC M5218L
14-J1,2	EJ-354105	PHONE J 2P HLJ0520-110 6.3
14-L1	EO-365240	COIL VARI 1 25-5592-11 85.80MH
14-L2	EO-365241	COIL VARI 1 25-5593-11 86.70MH
14-L3	EO-365243	COIL VARI 1 25-5594-11 81.20MH
14-L4	EO-365240	COIL VARI 1 25-5592-11 85.80MH
14-L5	EO-365241	COIL VARI 1 25-5593-11 86.70MH
14-L6	EO-365243	COIL VARI 1 25-5594-11 81.20MH
14-RL1	EQ-348929	RELAY SIGNAL G5A-232P 2TR 12V
14-R85	ER-341331	⚠ R OMF H S15 FS 1W 181J
14-R120 to 123	ER-364336	⚠ R OMF H S12 FS 1W 201J
14-TR3,4	ET-360067	TR 2SC3330 T,U F05
14-TR5,8	ET-348302	TR FET 2SK381 C,D F05
14-TR10	ET-352994	TR 2SC3401 F05
14-TR11	ET-353899	TR 2SA1317 S,T,U
14-TR12,13	ET-360067	TR 2SC3330 T,U F05
14-TR14	ET-352994	TR 2SC3401 F05
14-TR15	ET-353899	TR 2SA1317 S,T,U
14-TR16,17	ET-360067	TR 2SC3330 T,U F05
14-TR18	ET-348302	TR FET 2SK381 C,D F05
14-VR1,2	EV-358829	R S-FIX H RH0615CJ4J 3P 223

15. AMP P.C BOARD (JAPAN MODEL ONLY)

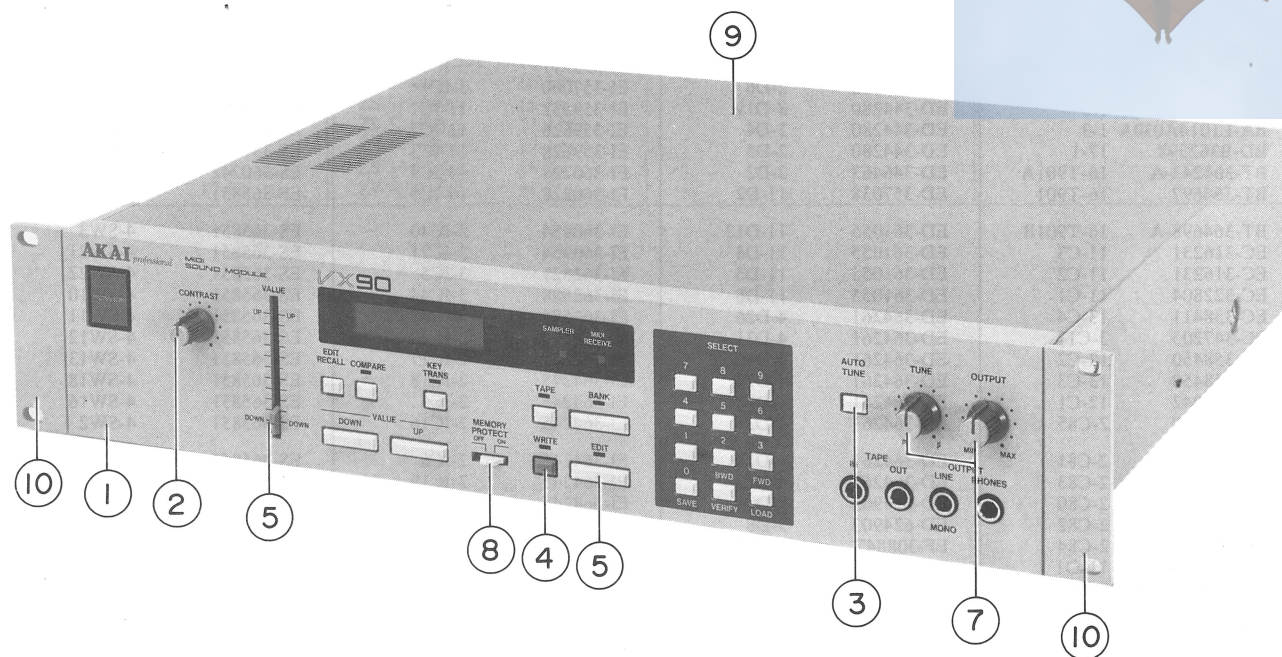| REF. NO.	PART NO.	DESCRIPTION
15-IC1	EI-346071	IC M5218L-21
15-IC2	EI-353227	IC M5216L
15-J1	EJ-354105	PHONE J 2P HLJ0520-110 6.3
15-J2	EJ-360771	DIN J TCS5037-01-241 13P

ASSEMBLY BLOCK
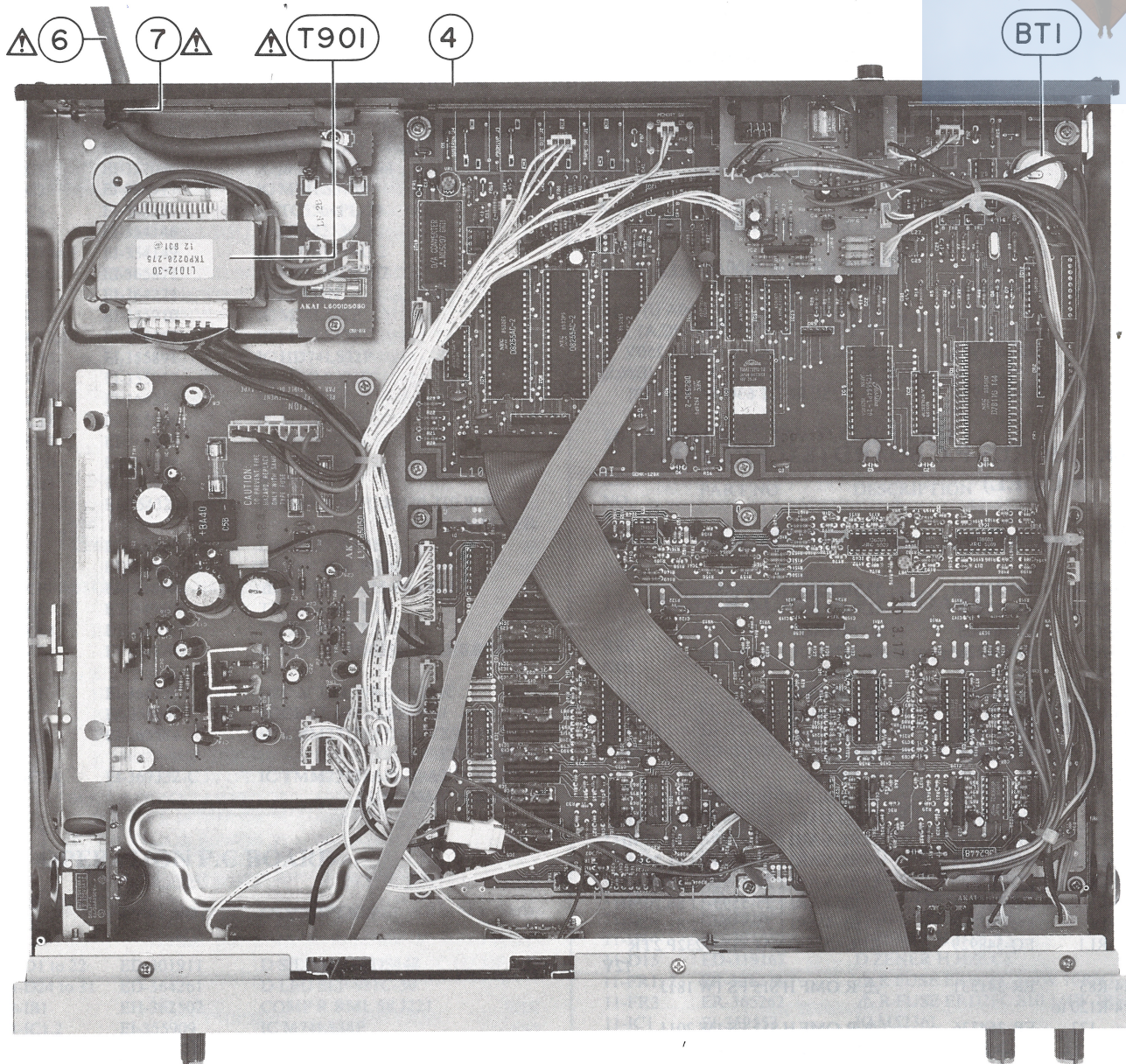
16. ASSEMBLY BLOCK

REF. NO.	PART NO.	DESCRIPTION	REF. NO.	PART NO.	DESCRIPTION
16-1x	SA-349332	FOOT	16-6D	EW-358631	⚠ AC CORD 2 CORES KS-17 LTBS2F BS [B]
16-2x	ZS-344754	ST PAN30×06STL CMT C080 [FOOT FIX]	16-6E	EW-358630	⚠ AC CORD 2 CORES KP560 LTSA2F KS17 S [S]
16-3x	ZS-304022	ST PAN40×06STL CMT [TRANS POWER FIX]	16-7	EZ-302906	⚠ STRAIN RELIEF SR-6N-4 [C,A]
16-4	SP-362396B	PANEL REAR VX90 (J)	16-8x	ZW-698308	RV NYL30×055 BL
16-4A	SP-362396C-A	PANEL REAR VX90 (C,A)	16-BT1	EZ-358816	BATTERY LITHIUM BR2032-1HF
16-4B	SP-362396A-A	PANEL REAR VX90 (E,V,B,S)	16-IN901	EM-365880	IND LCD DM001Z-1BL7
16-5x	ZS-319460	T2BR30×06STL BZN PROJECTION [PANEL REAR FIX]	16-J901	EJ-358633	⚠ SOCKET INLET SOT017 2P
16-6	EW-365947	⚠ AC CORD 250 SKP210KS17B A J [J]	16-SW901	ES-306430	⚠ SW SLIDE J-S4013 #01 01-2 [E,V,B,S]
16-6A	EW-357931	⚠ AC CORD 3 CORES VM0033A SJT18 AWG UC [C]	16-T901	BT-364697	⚠ TRANS POWER L1012-10 [J]
16-6B	EW-366055	⚠ AC CORD 250 KP11WSJT18UC	16-T901A	BT-364243-A	⚠ TRANS POWER L1012-30 [C,A]
16-6C	EW-359641	⚠ AC CORD 2 CORES KP-419C/KS-17 EV [E,V]	16-T901B	BT-364698-A	⚠ TRANS POWER L1012-50 [E,V,B,S]

17. FINAL ASSEMBLY BLOCK

REF. NO.	PART NO.	DESCRIPTION
17-1	BD-B362398	PANEL FRONT PART
17-2	SK-B371692-A	KNOB SINGLE GRAY PART
17-3	SK-362347A-A	KNOB PUSH (1)
17-4	SK-362347B-A	KNOB PUSH (2)
17-5	SK-362352-A	KNOB PUSH (L)
17-6	SK-358066C	KNOB SLIDE (2)
17-7	SK-B364614	KNOB MONITOR WHITE (2) PART
17-8	SK-363999	KNOB EQ
17-9	SP-362394B	COVER UPPER (B)
17-10	SH-362401A	RACK HANDLE
17-11x	ZS-321783	ST BID40×10STL NI3
17-12x	ZS-341959	ST BID40×06STL NI3

VX90

PART NO.	REF. NO.	PART NO.	REF. NO.	PART NO.	REF. NO.	PART NO.	REF. NO.
BA-L1013A020B	1-2	ED-344280	2-D12	EI-355909	4-IC2	ER-364336	14-R121
BA-L1013A050B	1-1	ED-344280	2-D18	EI-355910	3-IC12	ER-364336	14-R122
BA-L1013A060A	1-4	ED-344280	2-D7	EI-355917	3-IC2	ER-364336	14-R123
BA-L1013A060B	1-4A	ED-344280	2-D15	EI-355917	3-IC16	ER-364336	14-R120
BA-L1013A060C	1-4B	ED-344280	2-D6	EI-357060	3-IC1	ER-365262	11-FR3
BA-L1013A070B	1-5	ED-344280	2-D19	EI-359552	11-IC1	ER-366282	3-R37
BA-L1014A030A	1-3	ED-344280	2-D4	EI-359626	11-IC2	ES-306430	16-SW901
BD-B362398	17-1	ED-344280	2-D5	EI-359628	11-IC3	ES-337902	12-SW1
BT-364243-A	16-T901A	ED-346463	2-D2	EI-360228	14-IC9	ES-360242	10-SW1
BT-364697	16-T901	ED-357038	11-D2	EI-360228	14-IC5	ES-365851	4-SW15
BT-364698-A	16-T901B	ED-361055	11-D12	EI-360954	2-IC40	ES-365851	4-SW3
EC-316231	11-C3	ED-361055	11-D3	EI-360954	3-IC21	ES-365851	4-SW21
EC-316231	11-C2	ED-361055	11-D5	EI-362521	3-IC5	ES-365851	4-SW22
EC-322804	11-C1	ED-361055	11-D6	EI-362588	3-IC44	ES-365851	4-SW10
EC-338411	13-C4	ED-364261	4-D26	EI-362588	3-IC45	ES-365851	4-SW11
EC-347205	3-C11	ED-364261	4-D31	EI-364245	2-IC20	ES-365851	4-SW12
EC-358450	13-C2	ED-364261	4-D30	EI-364245	2-IC17	ES-365851	4-SW13
EC-358450	13-C3	ED-364261	4-D24	EI-364245	2-IC18	ES-365851	4-SW18
EC-361942	12-C1	ED-364261	4-D28	EI-364245	2-IC5	ES-365851	4-SW16
EC-362220	2-C85	ED-364261	4-D25	EI-364245	2-IC16	ES-365851	4-SW2
EC-362220	2-C81	ED-364261	4-D29	EI-364245	2-IC6	ES-365851	4-SW9
EC-362220	2-C83	ED-364261	4-D27	EI-364245	2-IC19	ES-365851	4-SW1
EC-362220	2-C80	ED-624903	3-D7	EI-364245	2-IC10	ES-365851	4-SW4
EC-362220	2-C82	ED-624903	3-D8	EI-364245	2-IC8	ES-365851	4-SW7
EC-362220	2-C84	EF-308847	11-F2A	EI-364245	2-IC7	ES-365851	4-SW20
ED-200213	11-D1	EF-309387	11-F3	EI-364245	2-IC15	ES-365851	4-SW14
ED-301911	2-D3	EF-309387	11-F4	EI-364245	2-IC9	ES-365851	4-SW5
ED-301911	3-D9	EF-309387	13-F1	EI-364245	2-IC11	ES-365851	4-SW19
ED-301911	3-D6	EF-309392	11-F4A	EI-364245	2-IC12	ES-365851	4-SW6
ED-301911	3-D5	EF-309392	11-F3A	EI-364245	2-IC13	ES-365851	4-SW17
ED-301911	3-D3	EF-309392	13-F1A	EI-364245	2-IC14	ES-365851	4-SW8
ED-301911	3-D4	EF-311839	11-F2	EI-364246	2-IC31	ET-348302	14-TR18
ED-301911	3-D2	EF-355226	11-F3C	EI-364246	2-IC33	ET-348302	14-TR5
ED-301911	3-D1	EF-355226	11-F4C	EI-364246	2-IC32	ET-348302	14-TR8
ED-301911	4-D6	EF-358974	13-F1C	EI-364246	2-IC34	ET-349081	2-TR5
ED-301911	4-D21	EF-359343	11-F2C	EI-364246	2-IC36	ET-349081	2-TR15
ED-301911	4-D1	EF-601942	13-F1B	EI-364246	2-IC35	ET-349081	2-TR14
ED-301911	4-D15	EF-601964	11-F2B	EI-364247	2-IC43	ET-349592	2-TR3
ED-301911	4-D16	EF-623103	11-F3B	EI-364247	2-IC42	ET-349592	2-TR2
ED-301911	4-D17	EF-623103	11-F4B	EI-364253	3-IC17	ET-349592	2-TR1
ED-301911	4-D7	EH-355561	3-IB1	EI-364257	3-X1	ET-349608	3-TR1
ED-301911	4-D14	EH-355561	3-IB4	EI-364273	3-IC11	ET-349608	3-TR2
ED-301911	4-D11	EH-355561	3-IB2	EI-364275	3-IC19	ET-352994	2-TR16
ED-301911	4-D18	EH-355561	3-IB3	EI-364308	14-IC8	ET-352994	14-TR14
ED-301911	4-D13	EH-362502	4-IB1	EI-364308	14-IC4	ET-352994	14-TR10
ED-301911	4-D10	EH-362519	3-IB5	EI-364319	2-IC1	ET-353899	14-TR15
ED-301911	4-D12	EI-302233	2-IC4	EI-364319	2-IC2	ET-353899	14-TR11
ED-301911	4-D19	EI-302233	2-IC3	EI-365584	3-IC3	ET-354083	11-TR2
ED-301911	4-D20	EI-310036	2-IC30	EI-365872	3-IC10	ET-354083	11-TR7
ED-301911	4-D22	EI-310036	2-IC29	EI-366167	3-IC13	ET-354167	3-PH1
ED-301911	4-D9	EI-310036	2-IC28	EI-366167	3-IC14	ET-356817	11-TR1
ED-301911	4-D8	EI-337228	2-IC38	EI-367332-C	3-IC3A	ET-356817	11-TR3
ED-301911	4-D2	EI-337228	2-IC27	EJ-354105	14-J2	ET-360067	2-TR4
ED-301911	4-D4	EI-337228	2-IC21	EJ-354105	14-J1	ET-360067	3-TR4
ED-301911	4-D3	EI-337228	2-IC22	EJ-354105	15-J1	ET-360067	11-TR5
ED-301911	4-D5	EI-337228	2-IC25	EJ-354269	6-J2	ET-360067	11-TR6
ED-301911	11-D13	EI-337228	2-IC23	EJ-354269	6-J4	ET-360067	11-TR4
ED-301911	14-D4	EI-337228	2-IC39	EJ-354269	6-J3	ET-360067	14-TR13
ED-301911	14-D6	EI-337228	2-IC37	EJ-357735	6-J1	ET-360067	14-TR17
ED-301911	14-D8	EI-337228	2-IC41	EJ-358633	16-J901	ET-360067	14-TR16
ED-301911	14-D10	EI-337228	2-IC24	EJ-358691	3-1	ET-360067	14-TR4
ED-301911	14-D9	EI-337228	2-IC26	EJ-360771	5-J1	ET-360067	14-TR3
ED-301911	14-D5	EI-337228	14-IC11	EJ-360771	15-J2	ET-360067	14-TR12
ED-301911	14-D7	EI-337228	14-IC13	EJ-363001	2-1	EV-307709	3-VR1
ED-301911	14-D3	EI-337228	14-IC2	EJ-364256	3-J5	EV-336770	2-VR8
ED-306012	11-D7	EI-337228	14-IC1	EJ-364322	3-J4	EV-336770	2-VR7
ED-319167	11-D4	EI-337228	14-IC7	EM-365880	16-IN901	EV-358829	14-VR2
ED-319167	11-D15	EI-337228	14-IC6	EO-360068	13-FL1	EV-358829	14-VR1
ED-329058	11-D11	EI-346071	15-IC1	EO-365240	14-L1	EV-359549	7-VR2
ED-329058	11-D9	EI-348123	11-IC4	EO-365240	14-L4	EV-362513	8-VR1
ED-331617	11-D14	EI-353227	14-IC12	EO-365241	14-L5	EV-365852	9-VR1
ED-331626	2-D1	EI-353227	15-IC2	EO-365241	14-L2	EV-367321	7-VR1
ED-344280	2-D13	EI-354146	3-IC6	EO-365243	14-L6	EW-357931	16-6A
ED-344280	2-D11	EI-354149	3-IC7	EO-365243	14-L3	EW-358630	16-6E
ED-344280	2-D9	EI-354149	3-IC9	EQ-348929	14-RL1	EW-358631	16-6D
ED-344280	2-D17	EI-354149	3-IC8	ER-326169	3-FR1	EW-359641	16-6C
ED-344280	2-D8	EI-355891	3-IC15	ER-328278	11-FR2	EW-359947	16-6
ED-344280	2-D10	EI-355904	3-IC20	ER-328278	11-FR1	EW-366055	16-6B
ED-344280	2-D14	EI-355906	3-IC18	ER-341331	14-R85	EZ-200473	11-1
ED-344280	2-D16	EI-355909	4-IC1	ER-360725	11-R1	EZ-302906	16-7

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PART NO.	REF. NO.	PART NO.	REF. NO.	PART NO.	REF. NO.	PART NO.	REF. NO.
EZ-358816	16-BT1	SP-362394B	17-9	ZW-698308	16-8x		
SA-349332	16-1x	SP-362396A-A	16-4B				
SH-362401A	17-10	SP-362396B	16-4				
SK-B364614	17-7	SP-362396C-A	16-4A				
SK-B371692-A	17-2	ZS-304022	16-3x				
SK-358066C	17-6	ZS-319460	16-5x				
SK-362347A-A	17-3	ZS-321783	17-11x				
SK-362347B-A	17-4	ZS-341959	17-12x				
SK-362352-A	17-5	ZS-344754	16-2x				
SK-363999	17-8	ZW-632226	11-2				

ABBREVIATIONS FOR THE SERVICE MANUAL

ABBREVIATION	EXPLANATION	ABBREVIATION	EXPLANATION
AMP (Amp)	AMPlifier	MINI	MINImum
BBD	Backet Brigade Diode	MIX	MIXer
BCD	Binary Code Decimal	MOD	MODulation
B.DOWN	Brak Down	M.WHEEL	Modulation WHEEL
B.UP	Back UP	OSC	OSCillator
CE	Chip Enable	RAM	Random Access Memory
CH	CHannel	RD	ReaD
COMP	COMParator	REG	REGulator
CONT	CONTrol	RESO	RESOnance
CV	Control Voltage	RL	ReLay
D/A	Digital to Analogue	ROM	Read Only Memory
EG	Envelope Generator	S/H	Sample and Hold
EXT	EXTernal	SW	SWitch
FREQ	FREQuency	THRU	THRoUgh
HPF	High Pass Filter	TRANS	TRANSpose
INH	INHibit	U	Upper
INT	INTerrupt	VA	Voltage Analog
INV	INVerter	VCA	Voltage Controlled Amplifier
L	Lower	VCF	Voltage Controlled Filter
LFO	Low Frequency Oscillator	VR	Variable Resistor
MAX	MAXimum	VREF	REFerence Voltage
MEMO	MEMOry	WR	WRite
MIDI	Musical Instrument Digital Interface		

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